

REMARKS/ARGUMENTS

This Amendment accompanies a Request for Continued Examination and responds to issues raised in the Official Action of July 10, 2008, a Final Rejection, as well the examiner's comments in the Advisory Action of October 8, 2008.

Referring first to the examiner's comments in the Advisory Action of October 8, 2008, claims 26 and 28 have been amended and directed to polyether polyols.

New claims 29-32 have been added. These claims refer to the pot life and viscosity profile of the products of the present invention as discussed throughout the description and in particular on page 28 where the objectives are summarized. Basis for the values included in these new claims comes from the data in Table 4 and which is also shown graphically in Figures 1-6 of the drawings which are based upon Examples 7-12. These claims thus specify a minimum pot life and also viscosity and its rate of increase against time. Further, the claims specify that the polyurethane sealant is devoid of foaming which is also taken from the data on page 23 of the description.

Applicants wish to address two issues raised in the Advisory Action.

The claims as they now stand specify that the organic polyisocyanate and/or the isocyanate prepolymer is selected from the group consisting of MDI, TDI, MDI prepolymer and TDI prepolymer. MPEP §2111.03 reads as follows.

"The transitional phrase "consisting of" excludes any element, step, or ingredient not specified in the claims. In re Gary, 53 F.2d 520, 11 USPQ 255 (CCPA 1931);"

Thus, the transitional phrase "consisting of" in the present claims clearly excludes anything other than MDI, TDI, MDI prepolymer and TDI prepolymer. Therefore, the Examiner's position that the claims don't exclude blocked isocyanates is incorrect.

Hagio et al. (US 4,524,104) define blocked isocyanates as follows:

"Blocked polyisocyanates are reaction products of organic polyisocyanates with blocking agents, and any blocked polyisocyanate known to the art may be used in the present invention" (emphasis added) (column 6, lines 6-10) and state as follows;

"In the preparation of blocked polyisocyanates, organic polyisocyanates and blocking agents may be reacted by any methods known in the art. For instance, polyisocyanates are reacted at a temperature of generally 50°-120°C preferable 60°-100°C, with blocking agents, ..."

(column 7, lines 43-49). Clearly special steps are used to “block” Hagio’s polyisocyanates.

Therefore, obviously, mere organic polyisocyanates (which have not been reacted with blocking agents under heating) are not blocked polyisocyanates.

Further, Hagio et al. disclose that “Any organic polyisocyanate may be used in forming blocked polyisocyanate. Representative examples are aromatic polyisocyanates such as tolylene diisocyanates (TDI), diphenyl methane diisocyanates (MDI),...; and NCO-terminated compounds (prepolymers) obtained by reacting excess of these polyisocyanates with active hydrogen atom-containing compounds, for example, ... NOC-content of the prepolymers are usually at least 0.5% preferably 2-20% or more” extracted from column 6, line 60 to column 7, line 36.

This disclosure clearly indicates that organic polyisocyanates such as TDI, MDI, MDI prepolymer and TDI prepolymer are regarded as *precursors* of blocked polyisocyanates, and that a person skilled in the art clearly consider blocked polyisocyanates and mere polyisocyanates to be distinct from each other.

For example, the MDI base prepolymer used in the Example of the present application has a NCO-content of 26% (*see* Table 3 on page 22), which falls within the range of the NCO-content of the MCO-terminated compounds (prepolymers) disclosed in Hagio et al.

As explained above, even just from Hagio et al., it is clear that a person having ordinary skill in the art will be able to distinguish mere polyisocyanates from blocked polyisocyanates, and the transitional phrase “consisting of” in the claims clearly excludes blocked isocyanates. Therefore, the Examiner's position that the claims don't exclude blocked isocyanates is without merit.

Curing Temperature Conditions

Curing temperature conditions (cure at ambient temperature without heating and the product stays fluid for a while [= pot life]) are implicitly included in the claims when interpreted by a person skilled in this art. Although the claims do not explicitly include curing temperature conditions, it is fully apparent to a person having ordinary skill in the art under what curing temperature conditions polyurethane sealants are supposed to cure, and that curing temperature conditions for polyurethane **sealants** are different from those for **adhesive** compositions of Hagio et al – look no further than the title of Hagio et al.

It is well known to a person having ordinary skill in the art that sealants are used, for

example, in building sites (*see* the discussion at pages 1-3 of the specification), and sealants and adhesives belong to different technical fields.

Sealants and adhesives differ in required properties and functions. For example, the entry of "sealant" in Wikipedia, the free encyclopedia (<http://en.wikipedia.org/wiki/Sealant>) reads as follows:

"A sealant is a viscous material that changes state to become solid, once applied, and is used to prevent the penetration of air, gas, noise, dust, fire, smoke or liquid from one location through a barrier into another. Typically, sealants are used to close small openings that are difficult to shut with other materials, such as concrete, drywall, etc. Desirable properties of sealants include insolubility, corrosion resistance, and adhesion. Uses of sealants vary widely and sealants are used in many industries, for example, construction, automotive and aerospace industries.

The main difference between adhesives and sealants is that sealants typically have lower strength and higher elongation than do adhesives. Since the main objective of a sealant is to seal assemblies and joints, sealants need to have sufficient adhesion to the substrates and resistance to environmental conditions to remain bonded over the required life of the assembly. When sealants are used between substrates having different thermal coefficients of expansion or differing elongation under stress, they need to have adequate flexibility and elongation. Sealants generally contain inert filler material and are usually formulated with an elastomer to give the required flexibility and elongation. They usually have a paste consistency to allow filling of gaps between substrates. Low shrinkage after application is often required. Many adhesive technologies can be formulated into sealants.

No matter what the application, a sealant has three basic functions.

1. It fills a gap between two or more substrates.
2. It forms a barrier through the physical properties of the sealant itself and by adhesion to the substrate.
3. It maintains sealing properties for the expected lifetime, service conditions and environments."

Thus, because sealants and adhesives are recognized to differ in required properties and functions, their compositions are naturally different.

For example, the adhesive composition of Hagio et al. has to be cured by heating and a long time of aging in order to show string adhesion properties.

“The coated substrate is generally cured partially or completely by heating to the deblocking temperature or higher, followed by aging if necessary. Suitable heating means include, for example, circulating air ovens, infrared or near infrared heaters, high-frequency heaters and the like. Heating (curing of the composition) is usually, carried out at a temperature of 110°-250°C. preferably 120°-200°C. Heating time is usually 0.1-20 min. preferably 1-10 min. Conditions of aging can vary widely. For instance, aging may be conducted for 307 days at room temperature, or for 24 hours at 70°C.” (Hagio et al., column 9, lines 41-52).

In contrast to Hagio, the polyurethane sealant of the present invention has to fill cracks and the like at building or construction sites and hence has to cure at ambient temperature in a short time to meet the functional requirements.

This is so obvious to a person having ordinary skill in the art that only very few prior patent applications mention curing temperature conditions. Some examples of disclosures about curing temperature conditions in prior patent applications are given below.

“The polyurethane sealants, which are the subject matter of this invention, are prepared by mixing a polyether polyol or polyether polyol blend and an inorganic filler, and reacting the mixture with a polyisocyanate. The reaction will occur at room temperature in the absence of catalyst. However, to increase the reaction rate, catalysts may be added or the initiation temperature of the reactants may be increased to an upper limit of 120 degree F.” (USP 4,318,838 column, 1, line 66 to column 2, line 6).

“The polyurethane sealant may be formed by blending all the ingredients simultaneously but preferably components a and b are formulated separately and are combined at the point of use. Reaction preferably occurs at room temperature upon intermixing of the components.” (USP 4,716,070, column 3, lines 37-41).

“The resulting sealant had good stability and availability after 6 months storage in an atmosphere of nitrogen gas. In order to estimate the sealant's properties, it was coated on a glass plate in a thickness of 2 mm and cured at room temperature. The mechanical strength of the cured sealant was measured and illustrated in Table 1.” (USP 4,816,509, column 6, lines 63-68).

All of these disclosures indicate that in the field of polyurethane sealants, it is obvious to cure polyurethane sealants at room temperature.

There is no explicit disclosure in the present application about the curing temperature conditions for the polyurethane sealant of the present invention, unlike the adhesive composition of Hagio et al. The lack of disclosure about curing temperature conditions in the present application indicates that the polyurethane sealant of the present invention is cured at the same temperature as ordinary polyurethane sealants.

Although the claims do not directly include curing temperature conditions, it is obvious to a person having ordinary skill in the art that adhesives and sealants belong to different technical fields, and the polyurethane sealant of the present invention and the adhesive composition of Hagio et al. are cured at different temperatures.

Further, the temperature at which ordinary polyurethane sealants are cured is commonly known to a person having ordinary skill in the art.

The Advisory Action does not indicate whether or not the response filed September 23, 2008 was officially entered into the record. For completion of the record and assurance of entry and (re)consideration the previous observations and comments are repeated substantially as stated in the September 23, 2008 response.

The sole issue presented in the Official Action of July 10, 2008 is the rejection of claims 20, 23, 24 and 26-28 under 35 USC §103(a) as being unpatentable over Hagio et al ('104) in view of Laas et al ('044) and Nakamura et al ('034) and Hannah et al ('659). Applicants dispute the manner in which the prior art references are cited and applied and are concerned that it has been constructed on the basis of hindsight starting with knowledge of the present invention and then working backwards to find elements of it in the prior art. Before discussing the merits of the matter, it is useful to review the legal requirements for a rejection of the type now asserted.

To establish a case of *prima facie* obviousness, all of the claim limitations must be taught or suggested by the prior art. See M.P.E.P. § 2143.03. A claimed invention is unpatentable if the differences between it and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art. *In re Kahn*, 78 USPQ2d 1329, 1334 (Fed. Cir. 2006) citing the legal standard provided in *Graham v. John Deere*, 148 USPQ 459 (1966). The *Graham* analysis needs to be made explicitly. *KSR v. Teleflex*, 82 USPQ2d 1385, 1396 (2007). It requires findings of fact and a rational basis for combining the prior art disclosures to produce the claimed invention. See *id.* ("Often, it will be

necessary for a court to look to interrelated teachings of multiple patents . . . and the background knowledge possessed by a person having ordinary skill in the art, all in order to determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue“).

The use of hindsight reasoning is impermissible. *See id.* at 1397 (“A factfinder should be aware, of course, of the distortion caused by hindsight bias and must be cautious of arguments reliant upon ex post reasoning”). Thus, a *prima facie* case of obviousness under Section 103(a) requires “some rationale, articulation, or reasoned basis to explain why the conclusion of obviousness is correct.” *Kahn*, 78 USPQ2d at 1335; *see KSR*, 82 USPQ2d at 1396. A claim which is directed to a combination of prior art elements “is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art.” *Id.* at 1396. Finally, a determination of *prima facie* obviousness requires a reasonable expectation of success. *See In re Rinehart*, 189 USPQ 143, 148 (C.C.P.A. 1976).

In the Official Action, the Examiner takes the position that "it would have been obvious to utilize the salts in virtually any type of polyurethane yielding *system*, including two-component systems" and the position that "the use of virtually any unsaturated acid to block the catalyst would have been obvious in view of the teachings of the references" (Section 4 of the Official Action).

These comments ignore the fact that all the cited references except for Laas et al. (US 5,847,044) disclose bicyclic tertiary amines such as DBU, DBN and DBD and salts thereof with acids equally without distinction (Laas et al. discloses only bicyclic tertiary amines in the free form, but does not disclose any salts of bicyclic tertiary amines).

If the Examiner's position that "it would have been obvious to utilize the salts in virtually any type of polyurethane yielding system, including two-component systems" were correct, a person skilled in the art would have expected both bicyclic tertiary amines and salts thereof to work equally in virtually any type of polyurethane yielding system, including two-component systems. However, the reality is that free bicyclic tertiary amines do not work in the intended manner in the two-component system used in the present invention.

The discrepancy from the reality arises because the Examiner ignores the difference between the polyurethane yielding system used in the present invention and those used in the

cited references. The polyurethane-yielding system used in the present invention uses an unblocked isocyanate, unlike those used in Hagio et al. (US 4,524,104) and Hannah et al. (US 4,952,659), and the sealant of the present invention has to cure at ambient temperature without heating, unlike the adhesive composition of Hagio et al. and the polyurethane powder coating composition of Laas et al.

Nevertheless, the sealant of the present invention is required to stay fluid for a while (i.e., have a long pot life) after the ingredients are mixed, unlike the polyisocyanate foam system of Nakamura et al. (US 5,317,034). In the polyurethane-yielding system used in the present invention, whether the tertiary amine catalyst is in the free form or in the form of a salt makes a big difference, although it does not make much difference in the polyurethane-yielding systems used in the cited references. The Examiner seems to ignore this difference.

In this connection, although the Examiner alleges that the use of virtually any unsaturated acid to block the catalyst would have been obvious in view of the teachings of the references, none of the cited references suggest the significance of blocking the catalyst in a urethane-yielding system using an unblocked isocyanate to delay the onset of the urethane-forming reaction of isocyanate groups at ambient temperature, and the Examiner's position that the blocking the catalyst with an unsaturated acid would have been obvious is entirely based on hindsight guided from the knowledge of the present invention.

The Examiner has not given any reasoning as to how blocking the bicyclic tertiary amine catalyst would have been obvious from the cited references. It is necessary to block the catalyst to delay the onset of the urethane-forming reaction of isocyanate groups, only when the urethane-forming system fulfills the three conditions: 1) it requires curing at ambient temperature, 2) it uses an unblocked isocyanate and 3) it has to have a long pot life. The urethane-yielding systems used in the cited references either require heat curing, or use blocked isocyanates, or are not required to have a long pot life. Therefore, the applicants would like to strongly emphasize that the Examiner is critically mistaken to take the position that blocking the bicyclic tertiary amine catalyst would have been obvious from the cited references.

Further, in the present invention, the unsaturated acid to be used to block the bicyclic tertiary amine catalyst is restricted to several species that can attain both a long pot life and a rapid viscosity increase.

Hagio et al. defines the catalyst to be used merely by such a generic and broad term as (C) a cycloamidine or acid addition salt thereof (*see* abstract, column 2 and column 3, lines 14-19) and does not specifically disclose or suggest the restricted species of catalyst to be used in the present invention.

Nakamura et al. discloses salts of DBU with a broad range of acids as catalysts (column 5, lines 1-40, especially lines 1-4) but does not specifically disclose any of the restricted species of catalyst to be used in the present invention.

Laas et al. discloses bicyclic amidines such as DBN as a catalyst (column 4, line 65 through column 5, line 13), but Laas et al. does not disclose salts of bicyclic amidines with acids, much less salts of bicyclic amidines with the specific acid to be used in the present invention.

Hannah et al. merely discloses the reaction product of a bicyclic amidine such as DBU, DMN with phenol or various other acidic compounds (column 4, line 65 through column 5, line 27) as a catalyst, but does not specifically disclose or suggest the restricted species of catalyst to be used in the present invention.

Thus, none of the cited references disclose specifically the restricted species of catalyst to be used in the present invention.

Although the Examiner argues that "it would have been obvious to utilize salts derived from unsaturated acids and cyclic amidines, such as DBU, DBN, and DBD, in their art recognized capacity as catalysts for polyurethane and isocyanate based polymeric systems" in Section 4 of the Official Action, the unsaturated acid to be used in the present invention to block the bicyclic tertiary amine catalyst is restricted to several specific species that can attain the required objectives of both a long pot life and a rapid viscosity increase.

It is well established that the disclosure of a genus in the prior art is not necessarily a disclosure of every species that is a member of that genus (*see, e.g., In re Baird*, 16 F.3d 380, 382 (Fed. Cir. 1994)).

Therefore, the generic disclosure of unsaturated acids in the cited references is insufficient to make obvious the use of the specific species of catalyst to be used in the present invention.

Further responding, the present invention and Hagio et al. (USP 4,524,104) differ in both the components used in the polyurethane-yielding system.

The adhesive composition of Hagio et al. uses (A) an acrylic copolymer having NCO-reactive groups, and the acrylic copolymer (A) is prepared by copolymerizing an ethylenically unsaturated monomer (a) having at least one NCO-reactive group and an ethylenically unsaturated monomer (b) having no NCO-reactive group, and hence has a backbone solely made of carbon atoms. In contrast, in the present invention, a polyether polyol is used, and a polyether polyol necessarily contains oxygen atoms in its backbone, unlike the acrylic copolymer used in Hagio et al. Thus, Hagio et al. and the present invention are different in the urethane-forming polymer.

The adhesive composition of Hagio et al. uses (B) a blocked polyisocyanate obtained by reacting an organic polyisocyanate and a blocking agent (column 6, lines 7-10), an unblocked isocyanate such as MDI, TDI, MDI prepolymer and TDI prepolymer is used in the present invention.

The Examiner ignores this difference in the polyurethane-yielding system and merely reiterates that it would have been obvious to use salts derived from unsaturated acids and cyclic amidines in virtually any type of polyurethane yielding system, including two-component systems. However, the claims of the present application clearly specify that the use of a polyether polyol and an unblocked isocyanate is essential. Further, the adhesive composition of Hagio et al. is intended to be used in a quite different way (i.e., requires heating for curing). Although the §103 rejection over Hagio et al. in view of Laas et al and Nakamura et al. and Hannah et al. relies on Hagio et al. as the primary reference, the Examiner has not give any reasoning as to why a person skilled in the art, starting from the teaching of Hagio et al., which relates to a heat-curing polyurethane-yielding system, would have motivated to use a polyether polyol and an unblocked isocyanate instead of the acrylic copolymer (A) and the blocked polyisocyanate (B) of Hagio et al. to obtain a two-component sealant to be cured at ambient temperature, from the teachings of the secondary references. In this respect, the citation of Hagio et al. as the primary reference is improper, and hence the §103 rejection over Hagio et al. in view of Laas et al. and Nakamura et al. and Hannah et al. is also improper.

Thus, the §103 rejection is groundless and improper and therefore, should be withdrawn.

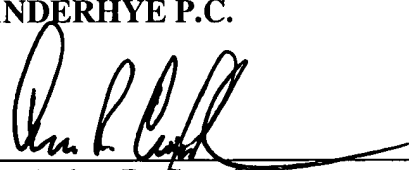
KOMETANI et al
Appl. No. 10/724,608
December 10, 2008

Applicants submit that the claims are in condition for allowance and earnestly solicit an early Notice to that effect. The examiner is invited to contact the undersigned if any further information is required.

Respectfully submitted,

NIXON & VANDERHYE P.C.

By: _____


Arthur R. Crawford
Reg. No. 25,327

ARC:eaw
901 North Glebe Road, 11th Floor
Arlington, VA 22203-1808
Telephone: (703) 816-4000
Facsimile: (703) 816-4100